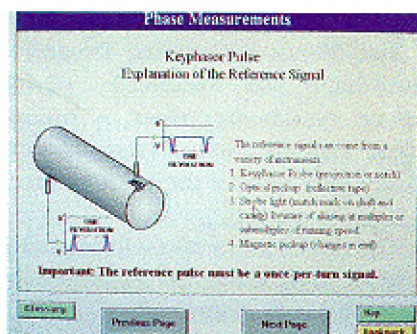


Training turns potential into profit



by **Rett Jesse**

Manager of Training and Marketing Services

Bently Nevada Corporation

Bently Nevada Product Service representatives are experts in the equipment used to acquire machinery vibration data. Our Machinery Diagnostic Services engineers are experts in determining the cause of machinery malfunctions. Perhaps they have helped you in the past. Our experts learned much of what they know at our own training courses. Now, the same training programs are available to you, to help you effectively protect and manage your machines.

Instrumentation and Control

Bently Nevada's Instrumentation and Control Program gives students a comprehensive understanding of the equipment used to acquire machine vibration data. The courses in this program teach the fundamentals of Bently Nevada machinery monitoring systems: installation, maintenance, operation and calibration checks. Students can specialize in either our industry-standard 3300 Monitoring System or in our newest, most advanced monitoring system, the 3500 Machinery Management System.

Each sequence of courses follows the natural flow of vibration data: from the machine to the analyst; from transducer to monitor to the end user. Each sequence begins with our *Transducer Installation and Maintenance* course. It is essential training on installing, maintaining and troubleshooting proximity, velocity and acceleration transducer systems. After all, properly installed transducers, operating correctly, are the most critical part of a machinery management system.

“ Skilled machinery specialists, using the monitoring and diagnostic systems to plot and analyze machine data, turn the power of machinery management into real plant profits.”

If you specialize in the 3300 Monitoring System, our *3300 Installation and Maintenance* course shows you how to connect various transducers to a 3300 Monitoring System, how to test the monitoring system for correct operation, and how to maintain the system for continued reliability. The last course in the 3300 sequence is *3300 Interfacing to Computers*. This course teaches you how to vastly improve your productivity, by using computer networks and modems to move data from the monitoring system to the people who need it, when they want it.

If you choose to specialize in the 3500 Machinery Management System, follow *Transducer Installation and Maintenance* with our *3500 Installation and Maintenance* course. It consists of two instructional videos and two computer-based tutorials. The videos give instruction on the 3500 Machinery Management System's hardware and software. The computer-based tutorials teach you how to configure the system and use the 3500 Operator Display Software. The 3500 Installation and

Maintenance course shows you how to connect the system to computer networks, and how to access it remotely, using a modem. The entire course takes from 3 to 5 days to complete.

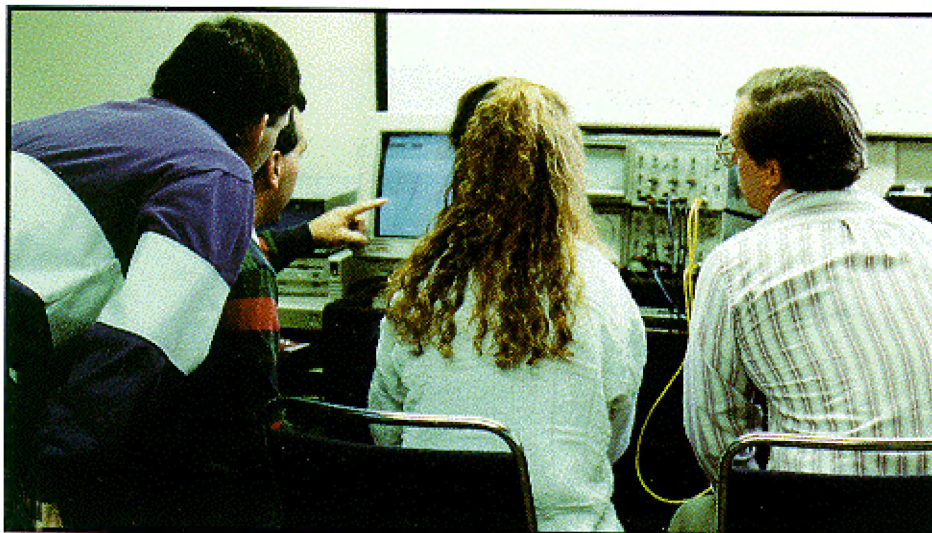
Machinery Diagnostics Specialist

The Machinery Diagnostics Specialist Program gives instruction in machine data acquisition, reduction and analysis. Its goal is to teach students how to properly interpret machinery data, so they can accurately identify machine faults from vibration and process data. This comprehensive program teaches the

fundamentals of machinery behavior, and their practical application in diagnosing rotating machinery problems.

The program begins with self-paced computer-based training, or a seminar that we conduct at your plant site. This introductory training includes:

- *Vibration Transducer Operation*
- *Vibration Transducer Selection*
- *Vibration Noise and Error Sources*
- *Noise Reduction Techniques*
- *Measurement Conventions*
- *Phase Measurements*



Next is our *Machinery Diagnostics* course, which teaches the core principles of machinery data analysis. We can conduct this course at your plant site, at a facility you choose, or at one of Bently Nevada's Training Centers. In this course, we explain why to use certain data presentation formats in certain circumstances, and how those formats expose particular machine characteristics. Graduates understand how to use:

Steady-state plots

- *Orbit*
- *Timebase*
- *Spectrum*
- *Full Spectrum*
- *Trend*
- *Shaft centerline*

Startup/Shutdown plots

- *Bode*
- *Polar*
- *Cascade*
- *Full spectrum cascade*
- *Shaft centerline*

In hands-on workshops, our students use these plots to identify machinery malfunctions, such as unbalance, misalignment, rubs, looseness, fluid-induced instability, shaft cracks and rolling element bearing problems. Our students become efficient and accurate troubleshooters, because our procedures for isolating and identifying machine problems use all of the plot formats available, not just a selected few.

Following the Machinery Diagnostics Course is our *Applied Diagnostics*

course. In this course, we study typical industrial machines, the problems that commonly occur and how they are diagnosed. It is valuable, practical experience on machines similar to those in your plant.

The course is particularly relevant because our students select the machine types and case histories that we study. Our students can choose to study:

- *Steam turbines*
- *Gas turbines*
- *Hydro turbines*
- *Motors*
- *Generators*
- *Exciters*
- *Compressors*
- *Pumps*
- *Fans*
- *Gearboxes*

First, our field-experienced instructors discuss each machine in detail. Next, in hands-on workshops, each stu-

dent analyzes actual machine case histories, using the most advanced diagnostic equipment available. Under close supervision, our students evaluate what is known about each machine and what data is available. Then, they devise a procedure for evaluating the data, and organize it in plot formats that best expose the machinery fault. We teach students how to clearly and convincingly present their findings. We then compare their analyses with the actual problems, as determined in the field by our Machinery Diagnostic Services engineers.

This extremely valuable program helps a new machinery specialist gain knowledge and confidence, and it gives experienced machinery diagnosticians new insights that improve their speed and accuracy.

Training is essential at every level

An effective machinery management program has several levels. It begins with correctly instrumented machines. Proper transducers, reliable wiring and appropriate monitors are the minimum requirement for protecting machines from catastrophic failure. Higher-level machinery management becomes possible when the monitoring systems are connected to online diagnostic systems. Machinery management becomes most efficient when those systems are networked with plant information systems or are remotely accessed. Skilled machinery specialists, using the monitoring and diagnostic systems to plot and analyze machine data, turn the power of machinery management into real plant profits.

Training makes machinery management work. We train plant personnel in every phase of machinery management, from raw data acquisition and processing, to system networking and remote access, to machinery diagnostics, to high-level rotor/bearing system modeling. Our training programs, with their comprehensive scope, can make you more productive and your plant more profitable. Let us show you how Bently Nevada Training can help you proactively protect and manage your machinery. ■